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**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A transgenic non-human animal that carries in the genome of its somatic and germ cells a transgene construct comprising (a) a transgene encoding a protein operably linked to (b) a first regulatory sequence for salivary gland specific expression of said protein, wherein said animal is selected from the group consisting of pigs, goats, sheep, cows, horses, fish and poultry.
- 10 2. The animal of claim 1 wherein said first regulatory sequence comprises a salivary protein promoter/enhancer sequence, whereby said animal expresses said protein in its salivary glands.
- 15 3. The animal of claim 2 wherein said saliva protein promoter/enhancer sequence comprises a parotid secretory protein (PSP) promoter/enhancer, a proline-rich protein (PRP) promoter/enhancer or a salivary amylase promoter/enhancer.
- 20 4. The animal of claim 3 wherein said promoter/enhancer is a parotid secretory protein (PSP) promoter/enhancer.
5. The animal of claim 4 wherein said parotid secretory protein (PSP) promoter/enhancer is derived from a mouse.
- 25 6. The animal of claim 3 wherein said promoter/enhancer is a proline-rich protein (PRP) promoter/enhancer.
7. The animal of claim 6 wherein said proline-rich protein (PRP) promoter/enhancer is derived from a rat.
- 30 8. The animal of claim 1 wherein said transgene is further operably linked to (c) one or more second regulatory sequences including enhancers, transcription regulatory sequences, termination sequences, and polyadenylation sites.

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*Sub A 1* > 9. The animal of any one of claims 1 to 8 wherein said animal is a pig.

10. The animal of any one of claims 1 to 9 wherein said protein is a phytase.

5 11. The animal of any one of claims 1 to 10 wherein said animal is a pig, said protein is a phytase and said first regulatory sequence comprises a parotid secretory protein (PSP) promoter/enhancer or a proline-rich protein (PRP) promoter/enhancer.

10 12. The animal of any one of claims 1 to 11 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

15 13. A transgenic non-human animal that carries in the genome of its somatic and germ cells a transgene construct, said construct comprising a transgene encoding phytase, wherein said animal is selected from the group consisting of pigs, goats, sheep, cows, horses, fish and poultry.

14. An animal according to claim 13 wherein said phytase is *Escherichia coli* 20 *AppA* phytase.

*Sub A 2* > 15. The animal of claim 13 or 14 wherein said transgene is operably linked to a first regulatory sequence for salivary gland specific expression of said phytase.

25 16. The animal of claim 15 wherein said first regulatory sequence comprises a parotid secretory protein (PSP) promoter/enhancer, a proline-rich protein (PRP) promoter/enhancer or a salivary amylase promoter/enhancer.

17. The animal of claim 13 wherein said phytase is expressed in saliva or in the 30 gastrointestinal tract of said animal.

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18. The animal of claim 13 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

19. A method of expressing a protein in the gastrointestinal tract of an animal, the 5 method comprising the steps of:

- introducing a transgene construct into a non-human animal embryo such that a non-human transgenic animal that develops from said embryo has a genome that comprises said transgene construct, wherein said transgene construct comprises:
  - a transgene encoding said protein, and
  - at least one regulatory sequence for gastrointestinal tract specific expression of said protein,
- transferring said embryo to a foster female; and,
- developing said embryo into said transgenic animal

wherein said transgene is produced in the gastrointestinal tract of said animal, wherein 15 said animal is selected from the group consisting of pigs, goats, sheep, cows, horses, fish and poultry.

20. The method of claim 19 wherein said regulatory sequence provides for salivary gland or pancreatic gland specific expression of said protein.

21. The method of claim 19 wherein said regulatory sequence provides for salivary gland specific expression of said protein.

22. The method of claim 21 wherein said salivary gland is a parotid gland, 25 submaxillary gland, or a submandibular gland.

23. The method of claim 21 wherein said transgene is expressed in the salivary gland of said animal.

24. The method of claim 19 wherein said at least one regulatory sequence comprises a salivary protein promoter/enhancer sequence.

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25. The method of claim 19 wherein said protein is a glycoprotein.

26. The method of claim 19 wherein said protein is a phytase.

5 27. A method according to claim 26 wherein said phytase is *Escherichia coli* *AppA* phytase.

28. The method of claim 19 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5, or SEQ ID NO:7.

10 29. A transgenic animal prepared according to the method of claim 19, or a progeny therof.

30. A process for producing a protein comprising the steps of:

15 a) obtaining salivary gland secretion containing said protein from a non-human transgenic animal, said animal containing within its genome a transgene construct, wherein said transgene construct comprises:

20 i) a transgene encoding said protein, and  
ii) at least one regulatory sequence for salivary gland specific expression of said protein, and  
extracting said protein from said saliva.

25 31. The process of claim 30 wherein said at least one regulatory sequence comprises a salivary protein promoter/enhancer sequence.

32. The process of claim 30 wherein said protein is a glycoprotein.

33. The process of claim 30 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

30 34. The process of claim 30 wherein said protein is a phytase.

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35. The process of claim 30 wherein said salivary gland is a parotid gland, submaxillary, or a submandibular gland.

36. A method for expressing a phytase in a non-human animal, said method 5 comprising:

a) constructing a nucleic acid sequence including a transgene construct comprising:

i) a transgene encoding said phytase, and

ii) at least one regulatory sequence for gastrointestinal tract specific 10 expression of said protein, and

b) transfecting the animal with said nucleic acid sequence;

whereby said animal carries within the genome of its somatic and germ cells said transgene construct and wherein said animal expresses said phytase in its gastrointestinal tract and wherein the animal is selected from the group consisting of

15 pigs, goats, sheep, cows, horses, fish and poultry.

37. The method of claim 36 wherein said transgene construct results in salivary gland or pancreatic gland specific expression of said phytase.

20 38. The method of claim 37 wherein said regulatory sequence provides for salivary gland specific expression of said phytase.

39. The method of claim 38 wherein said salivary gland is a parotid gland, submaxillary, or a submandibular gland.

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40. The method of claim 38 wherein said phytase is expressed in the saliva of said mammal.

30 41. The method of claim 38 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

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42. The method of claim 38 wherein said transgene construct comprises a nucleic acid sequence according to SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

5 43. The method of claim 38 wherein said animal is a pig.

44. A nucleic acid molecule comprising (a) a nucleic acid sequence encoding a phytase operably linked to (b) at least one regulatory sequence for gastrointestinal tract specific expression of said phytase.

10 45. The molecule of claim 44 wherein said at least one regulatory sequence comprises a salivary protein promoter/enhancer sequence, whereby expression of said protein is salivary gland specific.

15 46. The molecule of claim 45 wherein said salivary protein promoter/enhancer sequence comprises a parotid secretory protein (PSP) promoter/enhancer, a proline-rich protein (PRP) promoter/enhancer, a salivary amylase promoter/enhancer, or a SV40 promoter/enhancer.

20 47. The molecule of claim 44 wherein said molecule comprises a nucleic acid sequence according to SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

48. The molecule of claim 44 wherein said molecule includes a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

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49. An antibody specific to a protein expressed by a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7.

30 50. The antibody of claim 49 wherein said antibody is monoclonal.

51. The antibody of claim 49 wherein said antibody is polyclonal.

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52. A hybridoma secreting the antibody of claim 50.

*Sabas* > 53. A host cell transfected with molecule according to any one of claims 44 to 48.

54. The host cell of claim 53 wherein said cell is an animal cell.

55. A diagnostic kit for immunologically detecting a protein expressed by a nucleic acid sequence according to SEQ ID NO:3, SEQ ID NO:5; or SEQ ID NO:7,  
10 the kit including an antibody specific to said protein.

56. The kit of claim 55 wherein said antibody is monoclonal.

57. The kit of claim 56 wherein said antibody is polyclonal.

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